

Instructional Design (ID)

Toru Kagemori

Waseda University Honjo Senior High School

1. Introduction

In recent years, educational system in each country has been in the spotlight because of the global achievement test of PISA. Above all, Finland where is in the top rank of PISA has been took up by a lot of media. The lessons which are introduced there are not so special, however they put interactive conversation in the core curriculum.

Then, is Japanese way of education lesser than any other countries in every phase? It is not true. The students of top class are never lesser. From this fact, I can say that Japanese education has made good results for students who have a goal that are on extension of school education, but it has not made good results for heightening the level of students' culture because they did not enjoy their study.

Well then, what kind of education system is working in the countries which got high score in PISA ? I thought that those countries are studying on educational system deeply which Japanese educators are not studying on it so hard. When I asked teachers who live in foreign countries, I could talk to some teachers who form their lessons based on Instructional design which make educational effect improve.

Instructional design which is based on scientific evidence, considers solution of lessons which have no effect on students. For example, a lesson which has a passion but complacence, a lesson like exhibition, a lesson which contains only seminar, and a lesson which has only too much experiments has been improved by practice. ID has been continued studying for over 60years.

I thought that if I could put this system into my physics class, I would be able to develop my physics lessons effectively and change students' awareness for learning. Therefore, I tried to do some lessons which were based on Instructional design, little by little.

2,What is Instructional design

Instructional design is a study to design the most effective educational way under each teachers' instructive environment. In other words, ID is to design concrete lesson plans by learning about educational technology and educational science of teaching to apply this evidence to our lessons. And this is a practical study which needs to be used in practice and is improved by evaluation and feedback.

The design means to embody theory into real educational act and it has to be a goal based, all the time. And teachers judge the design effective or not from whether students reached their goal or not. Teacher regards design effective by students starting their learning willingly, and it is called “successful instruction”. In short, evaluation of teaching is judged not only by teachers but also by students.

In this paper, the word “learning” indicates a state where teachers can see a change of action of students, and the change is evaluated in examination.

ID can be carried without special technology and knowledge. Both expert and beginner compose effective lessons with their present skills or knowledge. They can improve contents of your lesson when they get educational skills or knowledge more. A reason why ID is called practical study is that they can pile their experiences in order to make their lessons maximum ability.

The scientific evidence of this instruction is based on Behavior Analysis, Cognitive Psychology, Situated Learning Theory, Psychology of Learning, Social Psychology and Clinical Psychology.

Design of lesson is carried by movement of students’ mind and a way of communication.

After they make sure learning of students, they will think about how to reinforce students’ study. Then they will evaluate students objectively by each step and improve the learning of students and their design.

Actually, the process of making ID is based on “ADDIE model” and “Rapid Prototyping”. ADDIE model is a way which goes through five processes.

The five processes are

*Analyze

*Design

*develop

*implement

*Evaluate

“ADDIE” needs to be considered carefully before operation, so it takes long time.

“Rapid Prototyping “ is created to solve this weak point. This is a way to execute prototype timely. After evaluation and feedback, teachers improve their lesson. While it can be executed soon, it can be thought that something that they have not expected happens.

Next, I will report a result of my lesson with specific examples. I tried to design two different lessons, one was done with ID and another was without it. I thought it is not good for education to use comparative lesson like this for a year, so I did it just in a few classes.

3. Process of class design

Time and date: 2011/Jan

Grade : second grade students,

Subject : physics 1 (3 credits)
Unit : Electric energy
Class : Super Science 2-A and 2-H(20 students each)

These classes were sat up to study advanced science, and consists of twenty students who passed a certain condition and wanted to join this class voluntarily.

Purpose : students should understand voltage and current in parallel and series circuits of resistance.

This lesson is completed in two hours.

In first period, I taught the way to calculate the value of resultant resistance and checked Ohm's law.

In second period, I taught electric power and its value.

3-1, Needs analysis and setting goal

“Needs” does not mean needs of students but lack of students’ knowledge and skills between goal, which teachers expect, and present.

Lesson is a solution which fills the Needs (lack) of students. In other words, class is not where teacher teaches what they want to teach one-way.

At the first of this lesson, I let them take an advance quiz to know their comprehension, knowledge and skill. The goal of this lesson is to be able to calculate voltage and current and electric power in a parallel and series circuits of resistance.

I made two plans so that I could change the contents of lesson, depending on result of the comprehension quiz. One is for a case that students need to review electricity, another is for them who do not need it.

3-2. Students analysis

It is very important to analyze students. I have to know whether the students can concentrate on class for an hour or not, are good at exercises or not, can calculate quickly or not and how much knowledge they have. This lesson was conducted in term 3, so I had already known these things. Therefore, I passed this process.

The most important thing is that if the lesson matches with learning style of students, they can improve their skills greatly, but the lesson that is done with teacher' pace does not let them improve efficiency all the time. We ought to ask questions to students frankly and find an appropriate way to match pedagogy with learning style that students prefer.

Therefore I incorporated experimental demonstrations, peer instruction, discussion and quiz in this lesson

3-3. Context analysis

In real lesson, we use class room, school yard and laboratory and make use of facilities and tools. However, these things can influence contents of lessons. As I mentioned at first, it is very important to know context of environment of education. And it is also important to think about situation in which students exploit what they learned and to consider transferring it to their life smoothly.

I had this lesson in our physics laboratory. We set long table which has a structure for experiment and discussion in the room. Also, there are large television, computer projector and OHC. Moreover, this laboratory contains many educational tools in order to demonstrate almost all the experiments that are inserted in text books.

4, How to teach

Dr.Robert Mills Gagné answered the question that what point should they notice so that they design effective lessons. That is “nine condition of learning”. However the way of embodiment the nine condition of learning depends on each teacher.

《introduction》 preparation for new learning

- 1, to catch students' attention
- 2, to tell a purpose
- 3, to make students remember knowledge that they have already had

《giving information》 touch new things

- 4, to show teaching materials
- 5, to guide their learning

《learning activity》 deep understand

- 6, to make an opportunity for practice
- 7, to feed back

《conclusion》 check the accomplishment and keep it

- 8, to evaluate
- 9, to lead students to preservation and extension

I will give points in order to think about each condition

(1) to catch an attention

- 1a to start a lesson with strange variation
- 1b to ask a question which stimulates curiousness
- 1c to start from interesting point like a core of episode or problem

(2) to tell a purpose

- 2a firstly, to explain about today's goal
 - 2b to give the check points to show which part should students notice
 - 2c to find the meaning of lesson by confirming use of the lesson.
 - 2d to check a goal so that students can be pleased
- (3) to make students remember knowledge that they have already had
- 3a to review base knowledge that is required in new learning
 - 3b to indicate connection between lessons learned and learn
 - 3c to give quiz for review, simple description and question
- (4) to show teaching materials (Behavior analysis)
- 4a to show some sample and tell what students will learn
 - 4b to use a lot of specific examples
 - 4c firstly, to show typical and simple example and then give special or exceptional example
 - 4d to contrive how to show diagram or illustration
- (5) to guide learning (Cognitive psychology)
- 5a to emphasize relation with previous learning and adopt them
 - 5b to compare with well known things
 - 5c to think about a hint to remember
- (6) to make an opportunity for practice (Behavior analysis, Cognitive psychology,
Situating learning theory)
- 6a to do rehearsal in order to find weak point
 - 6b to let them try without model to recognize own level
 - 6c to make practice more difficult step by step
 - 6d to show different way in order to test applied ability
- (7) to feed back
- 7a to consider the lessons from failure and consider cause of failure.
 - 7b to guarantee that there is no risk if students get failure and avoid aggressive comments
 - 7c to give a compliment for success and give an advise for failure
- (8) to evaluate
- 8a after giving enough chance for practice, to conduct exam
 - 8b to prepare enough volume and width

•8c strive to give a faithful value to goal

(9) to lead students to transfer and extension

•9a make a plan for confirmative test

•9b to develop learning students could do and connect it with next learning

•9c to prepare developmental learning and make understanding more deeply